

REMARKS

This is in response to the Office Action of May 8, 2003. In view of the following representations, the Examiner is respectfully requested to reconsider the merits of the present application.

In the Office Action of May 8, 2003, claims 1, 2, 5, 7, 9 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by van Phuoc et al. (USPN 5,796,239). This rejection differs from the previous rejection of these claims in that the Examiner now takes the position that the van Phuoc reference "anticipates" the claims. However, as will be demonstrated below, the van Phuoc method is similar to the conventional method described in the specification and clearly does not meet the limitations of independent claims 1 and 7.

The present invention is directed to a residual capacity correction method for a battery in which a learning capacity is corrected when an accumulated quantity of charge capacity of the battery is reached at a learning capacity, rather than when the battery is fully charged, or fully discharged. Even if battery charging is not repeated continuously, the present invention corrects the full charged capacity when the accumulated quantity reaches the learning capacity.

Claim 1 requires making a count of one cycle each time an accumulated quantity of a charge capacity of a battery reaches a set capacity. Claim 1 also requires decreasing a learning capacity by a specified cycle degradation capacity per charge of the one cycle.

The present invention, as defined in claim 1, is not directed to a residual capacity correction which learns actual battery capacity based on either full discharge capacity

value (at which a fully charged battery is completely discharged), or full charge capacity value (at which a fully charged battery is completely charged).

As defined in claim 1, the residual capacity correction method of the present invention corrects actual battery capacity by calculating the accumulation of charged capacity each and every time, even if partial charging occurs intermittently, or partial charging and discharging occurs repeatedly, and by calculating specific cycle degradation capacity when the accumulation reaches the actual capacity at that time.

In other words, the battery capacity, impacted by cycle degradation, can be corrected even if the battery is not fully charged or discharged. This is the primary distinction between the present invention and the references applied by the Examiner. In accordance with the conventional method, battery capacity is determined based only on full charge or full discharge capacity.

As previously discussed, and in accordance with the van Phuoc method, actual battery capacity is learned at EOC (end of charging) and EOD (end of discharging). The Examiner's attention is directed to column 7, lines 38-49 of the van Phuoc reference which state:

"As will be hereinafter explained in greater detail, the reset logic will reset CAP_{FC} as a function of which EOD signal was acted on. Thus a new CAP_{FC} value for the smart battery's actual capacity is learned after each full discharge cycle, as a function of the last fully integrated battery discharge cycle. The smart battery 10 of the present invention is thus able to self correct CAP_{FC} within one full cycle to readjust its capacity at each EOC and EOD, and effectively relearn full battery capacity within a single cycle, even if all prior battery history has been extinguished by virtue of a catastrophic memory failure." (Emphasis added)

In view of the above, it now should be clear that the van Phuoc reference does not teach or suggest the method recited in claims 1 and 7 of the present invention, but rather van Phuoc is similar to the method described in the "Background of the Invention" in the present application. In the statement of the rejection, the Examiner refers to col. 30, lines 14-40 to support the Examiner's contention that the van Phuoc method makes a count of one cycle each time an accumulated quantity of a charge capacity of a battery reaches a set capacity. However, this portion of van Phuoc does not say anything regarding counting a cycle each time an "accumulated" quantity of a charge capacity of a battery reaches a set capacity. Accordingly, the Examiner is requested to specifically indicate the text that discusses the "accumulated" quantity.

Furthermore, claim 7 is directed to a method of effectively correcting actual battery capacity reduction caused by the battery preservation, more specifically correcting actual battery capacity by subtracting preservation degradation capacity, which is defined based on battery temperature and residual capacity.

In particular, claim 7 requires "specifying a decreasing rate of a learning capacity as a keeping degradation capacity while a keeping temperature and a residual capacity of the battery are used as parameters." Claim 7 further requires "decreasing, as a keeping time passes, the learning capacity by the keeping degradation capacity specified from the keeping temperature and the residual capacity of the battery."

Clearly, van Phuoc does not teach or suggest these claimed features. In the rejection, the Examiner refers to column 27, lines 5-50 and column 28, lines 29-30 of van Phuoc. However, the referenced text merely describes a method of detecting EOC (end

of charge) of the battery and clearly does not disclose or suggest any type of correction based on preservation degradation of the battery.

Furthermore, in a rejection claims 4 and 12 under 35 U.S.C. § 103(a), the Examiner modifies the van Phuoc reference with Hagiwara et al. (USPN 6,114,836). The Hagiwara reference is cited by the Examiner for its disclosure of a lithium ion secondary battery. However, Hagiwara does not teach any of the features which are lacking in the van Phuoc reference, and therefore the Examiner's proposed combination still does not meet each any every limitation of the independent claims.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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